African Journal of Public Health and Health Systems

Methodology for Evaluating a Solar-Powered Oxygen System's Impact on Pneumonia-Related Neonatal Mortality in Rural Ghanaian Health Centres

Ama Serwaa Boateng[1], **Kwame Agyemang**[1,2], **Kofi Ansah-Mensah**[3,4], **Esi Nyarko Asante**[1,4]

[1] Ghana Institute of Management and Public Administration (GIMPA)

[2] University of Cape Coast

[3] Department of Pediatrics, University of Cape Coast

[4] Ashesi University

Published: 15 March 2003 | **Received:** 07 October 2002 | **Accepted:** 01 February 2003

Correspondence: aboateng@outlook.com

DOI: 10.5281/zenodo.18528381

Author notes

Ama Serwaa Boateng is affiliated with Ghana Institute of Management and Public Administration (GIMPA) and focuses on Medicine research in Africa.

Kwame Agyemang is affiliated with Ghana Institute of Management and Public Administration (GIMPA) and focuses on Medicine research in Africa.

Kofi Ansah-Mensah is affiliated with Department of Pediatrics, University of Cape Coast and focuses on Medicine research in Africa.

Esi Nyarko Asante is affiliated with Ghana Institute of Management and Public Administration (GIMPA) and focuses on Medicine research in Africa.

Abstract

Pneumonia is a leading cause of neonatal mortality in sub-Saharan Africa. Rural health centres frequently lack reliable medical oxygen due to unstable electrical grids, compromising effective treatment. Solar-powered oxygen systems present a potential solution, but rigorous methodologies for evaluating their impact on clinical outcomes in resource-limited settings are required. This methodology article describes the design of a study to evaluate the impact of solar-powered oxygen systems on pneumonia-related neonatal mortality in rural Ghanaian health centres. The primary objective is to determine the change in mortality rate following implementation. Secondary objectives are to assess system usability, cost-effectiveness, and maintenance requirements. A mixed-methods, quasi-experimental design with a historical control group is employed. The study is set in rural health centres in the Brong-Ahafo Region, Ghana. Quantitative data on neonatal admissions, diagnoses, and outcomes are collected retrospectively and prospectively from clinical records. Qualitative data on healthcare worker experiences and operational challenges are gathered through focus group discussions and key informant interviews. An economic evaluation will utilise a cost-consequence analysis framework. This is a methodology article; it presents the study design and protocols, not empirical results. The framework is intended to generate findings on clinical impact, implementation processes, and economic considerations. The described methodology provides a comprehensive and pragmatic framework for evaluating a complex health technology intervention in a low-resource setting. It balances rigorous assessment of clinical outcomes with a contextual understanding of implementation. Researchers evaluating similar interventions should consider mixed-methods approaches to capture both clinical and

operational outcomes. Emphasis should be placed on integrating robust data collection into routine health management information systems to ensure sustainability. Medical oxygen, neonatal health, pneumonia, health systems research, implementation science, sub-Saharan Africa, health technology assessment, mixed methods. This article contributes a detailed methodological framework for the real-world evaluation of solar-powered oxygen systems, addressing a critical evidence gap in neonatal care for low-resource, off-grid health facilities.

Keywords: *Neonatal mortality, Pneumonia, Solar-powered oxygen, Sub-Saharan Africa, Health systems research, Cluster randomised trial, Rural health centres*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

✉ REQUEST FULL PAPER

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa

Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge